Objective

Maximize profit by minimizing revenue loss under sudden 20% demand surge while facing raw material constraints.

Problem Statement

Unfulfilled orders due to an unexpected 20% increase in demand across all 5 SKUs, production is constrained by limited raw material capacity.

Scenario Analysis

Step 1: Identify the Constraint

Two raw materials are required:

- RM1
- RM2

After capacity comparison:

Required RM1 = 37,800 units
Available RM1 = 32,000 units

🔴**RM1** is the bottleneck **(Limiting Factor)**.

RM2 capacity is sufficient.

Step 2: Allocation Strategy

To maximize profitability under constraint:

- SKUs sorted by Contribution Margin
- RM1 allocated to highest margin SKUs first
- **SKU2 flagged as risk item:**
    - Lowest contribution margin
    - Highest RM1 consumption per unit
    - Low profit efficiency per unit of RM1

 This makes SKU2 the least attractive during shortage.

Findings

- **Level Achieved:** 91%
- All other SKUs fully served
- Profit maximized under constraint

We sacrifice low-margin SKU to protect high-margin portfolio.

Business Interpretation

- Instead of spreading shortage across all SKUs and hurting revenue everywhere, we concentrate on the impact on lowest profit item.
- This increases total contribution margin compared to equal distribution strategy.
- This is a classic Theory of Constraints decision.

Action Plan to Prevent Recurrence

1️⃣ Short-Term Actions

- Confirm reason for demand spike:
    - Promotion?
    - One-time order?
    - Market trend shift?
- Evaluate possibility of:
    - Expedited RM1 purchase
    - Alternate supplier
    - Temporary subcontracting

2️⃣ Medium-Term Actions

If demand shift is structural:

- Increase RM1 safety stock
- Revise capacity planning
- Introducing buffer stock policy
- Review forecast accuracy

3️⃣ **Long-Term Actions**

- Develop dual sourcing for RM1
- Conduct bottleneck analysis quarterly
- Introducing dynamic allocation model
- Build demand sensing system

Strategic Insight

Current model optimizes profit.

But future improvement could include:

- Protecting strategic SKUs
- Hybrid allocation model (profit + fairness)

Conclusion:

Under constrained conditions, the objective is not to fulfill all demand, but to maximize contribution margin per unit of constrained resource.

By prioritizing high-margin SKUs, we achieve 91% service level while protecting overall profitability.
